REMARKS

35 U.S.C. § 103. Claim Rejections.

1. Claims 23-26, 29-31, 33, 36, 37, 40 and 41 are rejected under 35 U.S.C. §103(a) as being unpatentable over Pischinger (U.S. Patent No. 6,066,999) in view of Yanai (U.S. Patent No. 6,634,327).

The Examiner submits that Pischinger discloses an "energy means provides energy (to braking coils [3.1] and 3.2) to decrease a local magnetic flux to repel the clapper and provide a soft landing at any of the closed position and the open position (col. 2 lines 10-36)."

The Office Action concedes that "Pischinger fails to teach the use of permanent magnet to latch the clapper in any of the closed position and the open position."

However, the Office Action also states that Yanai discloses "a valve system [figure 1], comprising a valve assembly [4] linearly moveable between a closed position and an open position; with a valve spring [14] and a disable spring [24], at least one electromagnet [30], at least one permanent magnet [38m, 36m] and a clapper [34] affixed to the valve assembly and moveable in relation to the electromagnet and the permanent magnet; wherein the magnetic field from at least one of the permanent magnets provides an attractive latching force to the clapper when the valve assembly is in any of the closed position and the open position', and [col. 5, lines 20-35, col. 6 lines 48-55]."

The Office Action then states that "it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the latching permanent magnets of Yanai with the valve assembly of Pischinger in order to create a valve latch in either the open position [or] closed position without the need of an addition coil current [col. 5 lines 20-35]."

Applicant has amended independent Claim 23, to claim a valve system, comprising:

a valve assembly linearly movable between a closed position and an open position;

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a valve spring which is compressed by the valve assembly when the valve assembly is located in the open position, and is uncompressed when the valve assembly is located in the closed position;

a disable spring which is compressed by the valve assembly when the valve assembly is located in the closed position, and is uncompressed when the valve assembly is located in the open position;

at least one electromagnet;

at least one permanent magnet having a magnetic field;

a clapper affixed to the valve assembly and movable in relation to the electromagnet and the permanent magnet; and

means for providing energy to each of at least one of the electromagnets for any of attracting the clapper and repelling the clapper;

wherein the magnetic field from at least one of the permanent magnets provides an attractive latching force to the clapper when the valve assembly is in any of the closed position and the open position; and

wherein the energy means provides energy to decrease a local magnetic flux from at least one of the permanent magnets, to repel the clapper and provide a soft landing at any of the closed position and the open position.

Support is seen in the Application as filed, at least on page 6, lines 1-5; on page 8, line 35 to page 9, line 3; on page 9, lines 8-10,14-24, 28-30 and 34-38; on page 10, line 1 to page 11, line 7; on page 12, lines 14-32; on page 14, lines 1-37; on page 15, lines 15-16 and 35-36; on page 16, lines 8-13; on page 17, lines 8-9; on page 18, lines 19-32; on page 19, lines 11-16; on page 22, lines 25-27 and 35-38; on page 26, lines 16-26; on page 27, lines 1-8; on page 28, lines 1-19 and 30-35; and in Figures 4-9, 11-13 and 25-26.

Applicant submits that neither Pischinger nor Yanai disclose, *inter alia*, an energy means which provides energy to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

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Pischinger describes an electromagnetic actuator having magnetic impact-damping means, as seen at least in the abstract, wherein:

> "An electromagnetic actuator includes an electromagnet having a yoke and an operating coil supported by the yoke and connectable to a controllable current supply for effecting a current flow through said operating coil. An armature is movable from a first position remote from the pole face of the electromagnet to a second, pole face-engaging position in response to a first electromagnetic force generated by a current flow through the operating coil. A resetting spring is coupled to the armature and opposes the first electromagnetic force. Further, a circuit is provided which is formed of a braking coil supported by the yoke and a switching element having open and closed states. The circuit is closed in the closed state of the switching element and is in the open state of the switching element. Also, a switch control arrangement is provided which is responsive at least indirectly to a distance of the armature from the pole face during motion of the armature toward the pole face for placing the switching element into its closed state when the armature is at a given distance from the pole face, whereby the circuit is closed for producing a second electromagnetic force opposing the first electromagnetic force."

As conceded by the Office Action, "Pischinger fails to teach the use of permanent magnet to latch the clapper in any of the closed position and the open position."

Applicant also submits that, while Pischinger provides energy to a braking coil (3.1 or 3.2) for a valve train "shortly before impact of the armature 4 at the respective pole surface 12" (as seen at least in Fig. 3 and in col. 4, lines 41-51), the applied energy is not applied to offset the magnetic attraction of a permanent magnet.

As there is no teaching of the use of permanent magnet in Pischinger, Pischinger therefore inherently fails to teach that energy be provided to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

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Yanai describes a an apparatus and method for detecting change of neutral position of an electromagnetic valve actuation system, and an apparatus and method for controlling the valve, as seen at least in the Abstract, wherein:

> "A valve is urged in the valve-opening direction by an upper spring and in the valve-closing direction by a lower spring. The valve is thus urged to a neutral position where the respective urging forces are balanced. The valve is controlled to be released from one of two terminal positions, that is, the full-open position or the full-closed position, and to be attracted to the position from which the valve has been released. The displacement pattern of the valve during this period is sensed by a displacement amount sensor, whereby the maximum displacement amount of the valve from that terminal position is measured. The change of the neutral position is detected based on the change of the measured maximum displacement amount with respect to a reference value."

Applicant submits that, although Yanai describes valve latching, Yanai does not disclose an energy means which provides energy to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

As well, Applicant submits that, while Pischinger and Yanai provide latching of a valve train, they take mutually exclusive paths to reach different solutions to a similar problem. For example, while Yanai provides permanent magnet latches (*e.g.* 36m,38m), Pischinger uses electromagnetic braking coils (*e.g.* coil 3.1, 3.2) to supply energy to latch a valve train. As seen at least in Fig. 2 and Fig. 3 of Pischinger, energy is required to be applied to electromagnetic coils, to provide latching in either a closed or open position.

Applicant therefore submits that, as Pischinger and Yanai take mutually exclusive paths to provide valve latching, it would inherently not be logical to combine them.

As well, Applicant submits that, even in combination, Pischinger and Yanai fail to meet Claim 23, as amended, in that neither Pischinger nor Yanai disclose, *inter*

alia, an energy means which provides energy to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

Applicant therefore submits that independent Claim 23, as amended is patentable, since a *prima facie* case of obviousness has not been established (MPEP 2142). First, the *prima facie* obviousness case is incomplete because neither Pischinger nor Yanai teach or suggest all the claim limitations (MPEP 2142, 2143.03).

To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention, or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references (Ex Parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985); MPEP 706.02(j)).

Applicant therefore submits that independent Claim 23, as amended, overcomes the rejection under 35 U.S.C. §103(a) as being unpatentable over Pischinger (U.S. Patent No. 6,066,999) in view of Yanai (U.S. Patent No. 6,634,327).

As dependent claims 24-27, 29-31, 33, and 36-41 depend from amended independent Claim 23, and inherently contain all the limitations of the claims they depend from, they are seen to be patentable as well.

2. Claims 23 and 27 are rejected under 35 U.S.C. §103(a) as being unpatentable over Pischinger (U.S. Patent No. 6,066,999) in view of Lequesne (U.S. Patent No. 4,829,947).

As discussed above, Applicant has amended independent Claim 23, to claim a valve system, comprising:

a valve assembly linearly movable between a closed position and an open position;

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a valve spring which is compressed by the valve assembly when the valve assembly is located in the open position, and is uncompressed when the valve assembly is located in the closed position;

a disable spring which is compressed by the valve assembly when the valve assembly is located in the closed position, and is uncompressed when the valve assembly is located in the open position;

at least one electromagnet;

at least one permanent magnet having a magnetic field;

a clapper affixed to the valve assembly and movable in relation to the electromagnet and the permanent magnet; and

means for providing energy to each of at least one of the electromagnets for any of attracting the clapper and repelling the clapper;

wherein the magnetic field from at least one of the permanent magnets provides an attractive latching force to the clapper when the valve assembly is in any of the closed position and the open position; and

wherein the energy means provides energy to decrease a local magnetic flux from at least one of the permanent magnets, to repel the clapper and provide a soft landing at any of the closed position and the open position.

Support is seen in the Application as filed, at least on page 6, lines 1-5; on page 8, line 35 to page 9, line 3; on page 9, lines 8-10,14-24, 28-30 and 34-38; on page 10, line 1 to page 11, line 7; on page 12, lines 14-32; on page 14, lines 1-37; on page 15, lines 15-16 and 35-36; on page 16, lines 8-13; on page 17, lines 8-9; on page 18, lines 19-32; on page 19, lines 11-16; on page 22, lines 25-27 and 35-38; on page 26, lines 16-26; on page 27, lines 1-8; on page 28, lines 1-19 and 30-35; and in Figures 4-9, 11-13 and 25-26.

As conceded by the Office Action, "Pischinger fails to teach the use of permanent magnet to latch the clapper in any of the closed position and the open position."

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As discussed above, Applicant submits that, while Pischinger provides energy to a braking coil (3.1 or 3.2) for a valve train "shortly before impact of the armature 4 at the respective pole surface 12" (as seen at least in Fig. 3 and in col. 4, lines 41-51), the applied energy is not applied to offset the magnetic attraction of a permanent magnet.

As there is no teaching of the use of permanent magnet in Pischinger, Pischinger therefore inherently fails to teach that energy be provided to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

Lequesne describes variable lift operation for a "bistable electromechanical poppet valve actuator", as seen at least in the Abstract, wherein:

> "A valve actuating device for an internal combustion engine is operated with partial valve lift. The valve is spring biased toward a neutral central position but held in full open or closed positions by permanent magnets having associated coils. Normal activation of the valve between full open and closed positions is by activation of a coil to fully cancel the field of the associated magnet with a spring moving the valve to the other position. Partial lift operation comprises providing, with the valve in its closed position, a valve opening current to the valve opening coil to reduce the closing magnetic field but stopping the current before the valve reaches its full open position and providing a valve closing current to one of the coils to cause the return of the valve to its closed position. Two modes of partial lift operation are described: a first in which valve movement is continuous with valve opening duration substantially proportional to valve lift and a second in which the valve is moved to a stable half lift position, left in this position for an arbitrary duration, and pulled back into the closed position."

While Lequesne discloses the use of a permanent magnets (*e.g.* 20), as seen at least in Fig. 1 and in col. 2, lines 6-35, Applicant submits that there is no disclosure or suggestion in Lequesne, express or implied, of an energy means which provides energy to decrease a local magnetic flux from at least one

permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

As well, Applicant submits that, while Pischinger and Lequesne provide latching of a valve train, they take mutually exclusive paths to reach different solutions to a similar problem. For example, while Lequesne provides permanent magnets (*e.g.* 20), Pischinger uses electromagnetic braking coils (*e.g.* coil 3.1, 3.2) to supply energy to latch a valve train. As seen at least in Fig. 2 and Fig. 3 of Pischinger, energy is required to be applied to electromagnetic coils, to provide latching in either a closed or open position.

Applicant therefore submits that, as Pischinger and Lequesne take mutually exclusive paths to provide valve latching, it would inherently not be logical to combine them. As well, there is no suggestion, express or implied, that Pischinger and/or Lequesne be modified to meet the claims.

Furthermore, Applicant submits that, even in combination, Pischinger and Lequesne fail to meet Claim 23, as amended, in that neither Pischinger nor Lequesne disclose, *inter alia*, an energy means which provides energy to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

Applicant therefore submits that independent Claim 23, as amended is patentable, since a *prima facie* case of obviousness has not been established (MPEP 2142). First, the *prima facie* obviousness case is incomplete because neither Pischinger nor Lequesne teach or suggest all the claim limitations (MPEP 2142, 2143.03).

To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention, or the Examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references (Ex Parte Clapp, 227 USPQ 972, 973 (Bd. Pat. App. & Inter. 1985). MPEP 706.02(j)).

Thus, Applicant submits that independent Claim 23, as amended, overcomes the rejection under 35 U.S.C. 103(a) over Pischinger (U.S. Patent No. 6,066,999) in view of Lequesne (U.S. Patent No. 4,829,947). As Claim 27 depends from Claim 23, it is seen to be patentable as well.

3. Claims 38 and 39 are rejected under 35 U.S.C. §103(a) as being unpatentable over Pischinger (U.S. Patent No. 6,066,999) in view of Yanai (U.S. Patent No. 6,634,327), as applied to claim 23, in view of Smith et al. (U.S. Patent No. 6,798,323).

As discussed above, Applicant has amended independent Claim 23, to claim a valve system, comprising:

a valve assembly linearly movable between a closed position and an open position;

a valve spring which is compressed by the valve assembly when the valve assembly is located in the open position, and is uncompressed when the valve assembly is located in the closed position;

a disable spring which is compressed by the valve assembly when the valve assembly is located in the closed position, and is uncompressed when the valve assembly is located in the open position;

at least one electromagnet;

at least one permanent magnet having a magnetic field;

a clapper affixed to the valve assembly and movable in relation to the electromagnet and the permanent magnet; and

means for providing energy to each of at least one of the electromagnets for any of attracting the clapper and repelling the clapper;

wherein the magnetic field from at least one of the permanent magnets provides an attractive latching force to the clapper when the valve assembly is in any of the closed position and the open position; and

wherein the energy means provides energy to decrease a local magnetic flux from at least one of the permanent magnets, to repel the clapper and provide a soft landing at any of the closed position and the open position.

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Support is seen in the Application as filed, at least on page 6, lines 1-5; on page 8, line 35 to page 9, line 3; on page 9, lines 8-10,14-24, 28-30 and 34-38; on page 10, line 1 to page 11, line 7; on page 12, lines 14-32; on page 14, lines 1-37; on page 15, lines 15-16 and 35-36; on page 16, lines 8-13; on page 17, lines 8-9; on page 18, lines 19-32; on page 19, lines 11-16; on page 22, lines 25-27 and 35-38; on page 26, lines 16-26; on page 27, lines 1-8; on page 28, lines 1-19 and 30-35; and in Figures 4-9, 11-13 and 25-26.

Smith et al. describes a welded AC electromagnet lamination assembly incorporating a shading coil, as seen at least in the Abstract, wherein:

> "An electromagnetically actuable device has a magnetic core proximate an armature and a coil selectively energized to draw the armature to the magnetic core. The armature and magnetic core are of laminated magnetic steel and have mating surfaces. At least one of the armature and magnetic core includes conductive weld or braze lines for integrally securing laminations together to define a conductive path proximate the mating surface to provide a shading coil."

While Smith et al. describes the use of laminated cores, there is no disclosure or suggestion in Smith et al., express or implied, of an energy means which provides energy to decrease a local magnetic flux from at least one permanent magnet, to repel a clapper and provide a soft landing at any of a closed position and an open position.

Applicant therefore submits that, even in combination, Pischinger, Yanai and Smith et al. fail to meet independent Claim 23, as amended. As well, there is no suggestion, express or implied, that Pischinger, Yanai and/or Smith et al. be modified to meet the claims.

Thus, Applicant submits that independent Claim 23, as amended, overcomes the rejection under 35 U.S.C. 103(a) over Pischinger (U.S. Patent No. 6,066,999) in view of Yanai (U.S. Patent No. 6,634,327), as applied to Claim 23 above, in view

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of Smith et al. (U.S. Patent No. 6,798,323). As Claims 38 and 39 depend from Claim 23, as amended, they are seen to be patentable as well.

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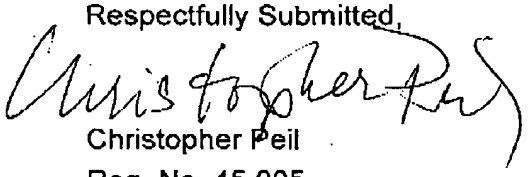
CONCLUSION

Applicant respectfully submits that Claim 23, as amended, and dependent claims 24-27, 29-31, 33, and 36-41 overcome the rejections set forth in the Office Action. Applicant also submits that the amendments do not introduce new matter into the Application. Based on the foregoing, Applicant considers the invention to be in condition for allowance. Applicant earnestly solicits the Examiner's withdrawal of the rejections set forth in the prior Office Action, such that a Notice of Allowance is forwarded to Applicant, and the present application is therefore allowed to issue as a United States patent.

Respectfully Submitted,



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